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Together, Making Healthcare the Career of Choice

Kansas City Healthcare Workforce Partners

Uncertain about your future?

Explore the many opportunities available in health care today

There's never been a more exciting time to consider a career in health care. [illegible] career or simply want to pursue a different career avenue, health care promises endless possibilities.

If you prefer interacting with [illegible] consider careers that provide [illegible] and their families, [illegible] physical therapy, diagnostic imaging [illegible] work independently and research the problems causing a particular medical condition, consider the career opportunities available in the laboratory or biomedical research.

> Health care is one of the few professions in which there truly is an opportunity for everyone to use their talents in jobs they enjoy.

If you prefer to work in an office setting where you can manage behind-the-scene operations, think about a career as a health information manager. Using your talents as a health care professional will lead to a satisfying career.

Plus, with the growing shortage of health professionals and an increased demand for health services, a career in health care promises an abundance of jobs, increased advancement opportunities, as well as attractive salary and benefits packages. Many health care organizations also are offering signing bonuses and scholarships to attract more people to use their skills in health care.

The careers highlighted in this brochure include educational requirements. For detailed information, including salary ranges and schools with educational programs for health careers, please visit www.kchealthcareers.com.

More than 10 million people in more than 200 careers are using their skills in health care settings. Join them in pursuing a fulfilling career as a health professional. The career possibilities are virtually unlimited, with the added reward of knowing you are making a difference in the lives of patients and their families.

THERAPEUTIC SERVICES

DIETETICS AND NUTRITION

EMERGENCY MEDICINE

MEDICAL CAREERS

MENTAL AND SOCIAL HEALTH

NURSING

PHARMACY

THERAPY AND REHABILITATION

BIOTECHNOLOGY RESEARCH AND DEVELOPMENT

CLINICAL SERVICES

FACILITY SERVICES

LABORATORY SERVICES

MANUFACTURING

REGULATORY/TECHNICAL SUPPORT

For more information, including salary ranges and schools with programs for health care careers, visit www.kchealthcareers.com.

THERAPEUTIC SERVICES

Careers in therapeutic services primarily are focused on changing the patient's health status throughout time. Health professionals in this pathway work directly with patients; they may provide care, treatment, counseling and health education information.

DIETETICS AND NUTRITION

Registered dieticians, dietetic technicians and dietetic assistants educate the public about what we eat and how it affects our health. In hospitals and nursing homes, these workers design healthy, personalized meals that adhere to diet restrictions mandated by patients' medical problems. Registered dieticians can design and present educational programs for communities and individuals to teach them the importance of good nutrition and its beneficial effects on their health, energy, appearance and general attitudes toward life.

▪ Dietetic Technician and Dietetic Assistant

Dietetic technicians and dietetic assistants aid registered dietitians in nutrition care services, help shape the public's nutrition and aid people with illnesses or injuries. Dietetic technicians screen patients to identify nutrition problems and provide patient education and counseling to individuals or groups. Dietetic assistants also work directly under a dietician but usually assume more clerical food service duties.

Academic Requirements — A two-year associate's degree program at an accredited college or university is required. Then, students should complete a program approved by the Commission on Accreditation for Dietetics Education and 450 hours of supervised practical experience. Dietetic assistants require no formal training and will learn appropriate skills on the job.

▪ Registered Dietitian

Registered dietitians (R.D.) are recognized as experts on food and nutrition. They promote and maintain health, prevent or treat illness and aid rehabilitation through nutrition education and diet intervention. There are many specific types of dietitians.

Academic Requirements — A bachelor's degree in nutrition or dietetics is required. Students may obtain a four-year degree that combines academic instruction with the necessary experience or may first earn a bachelor's degree and then train in the field for one to two years. All programs must be approved and accredited by the American Dietetic Association.

EMERGENCY MEDICINE

Emergency medical technicians (EMT) respond to medical emergencies in the field and provide immediate care to the critically ill or injured. There are three basic categories of employment: EMT-1 (basic), EMT-3 (intermediate) and EMT-4 (paramedic).

These emergency workers are usually the first medical care providers on the scene of an accident. EMTs stabilize and monitor patients in specifically equipped vehicles while in route to a medical facility, where they give a detailed account of the patient's status.

▪ Emergency Medical Technician

An EMT-1 (basic) has the least amount of training needed to qualify as an emergency medical technician. Along with other EMTs, an EMT-1 performs basic life support skills. An EMT-1 is accustomed to using stretchers, backboards, oxygen devices and splints.

An EMT-3 (intermediate) performs the same tasks as an EMT-1 but also is skilled in more advanced emergency treatment.

An EMT-4 (paramedic) undergoes the most training of all EMTs and may administer the most advanced emergency care. In rural areas, EMT-4s may be allowed to treat patients on the scene rather than taking them to an emergency medical facility.

Academic Requirements — Training for an EMT-1 consists of 140 hours of classroom exercises and 10 internship hours in a hospital emergency room. Upon completing the program, a trainee must pass written and practical examinations. EMT-3s require additional training, which includes 120 hours of instruction beyond that needed by an EMT-1. EMT-4 training is the most comprehensive and requires an additional 750 to 2,000 hours of training beyond the requirements of an EMT-1.

MEDICAL CAREERS

Today's medical field is much more specialized than it was a few generations ago. The doctors who made house calls to treat patients of all ages and symptoms of all types have disappeared. Today, patients visit health maintenance organization clinics or choose from a select group of physicians who are included under their health insurance plans.

Many of these changes resulted from the revolutionary medical advances that have expanded the health care field. This also has changed the medical fields that

students can choose to pursue. Today, you can become a physician (allopathic or osteopathic), chiropractor, podiatrist or toxicologist.

Assistant personnel, such as chiropractic technicians and assistants, medical assistants and podiatric medical assistants, will see increased job opportunities as a result of this cost maintenance trend.

▪ Dental Assistant

Dental assistants perform various tasks that may be interpersonal, technical or administrative. They expose and develop X-rays, coordinate and implement infection control products, take diagnostic impressions, maintain inventory control, perform numerous office management tasks and assist the dentist with equipment at chairside.

Academic Requirements — On-the-job training is a popular method of acquiring dental assistant skills. Community colleges, vocational schools, technical institutes or universities also offer training programs. Certification through the Dental Assisting National Board may be an asset when seeking employment. One-year program enrollees receive a certificate or diploma upon completion while those in two-year programs finish with an associate's degree. Certification is an option for training program graduates or for individuals with two years of experience.

▪ Dental Hygienist

A dental hygienist is a licensed health care professional who can provide direct care to the patient with numerous oral health services. They scale and polish teeth; apply cavity-preventive agents, such as fluoride and sealant; expose, process and interpret X-rays; monitor patients' medical and oral health; examine teeth and oral cavities; place temporary fillings and periodontal dressings; remove sutures; polish metal restorations; teach proper brushing and flossing techniques; and design and implement community or school oral health programs.

Academic Requirements — Education for dental hygiene can be obtained through a two-year certificate course or an associate's degree program from community colleges or vocational-technical schools. Although each program may have unique requirements for acceptance, at least one year of college is recommended. The prospective dental hygienist may complete a four-year bachelor's degree program at a college or university. A high school diploma is the minimum educational requirement for admission to dental hygiene schools.

▪ Dentist

Dentists detect, diagnose and treat problems affecting the teeth, gums, tongue, lips and jaws. In addition, they advocate preventive dental care by teaching their patients brushing, flossing and proper dietary habits. Dentists identify and fill cavities, repair any dental damage or breakage, analyze X-rays and also may prescribe medication or administer anesthetics. Cosmetically, dentists may improve patients' appearances through corrective surgery to the gums and mouth cavity.

Academic Requirements — Although a minimum of two years of college is sufficient for dental school admissions, a bachelor's degree is recommended. The Dental Admissions Test (DAT) is required for admission and will allow students to engage in four years of academic and clinical work at an accredited dental school. A doctor of dental surgery (DDS) or equivalent doctor of dental medicine (DMD) degree will be awarded upon graduation. State and national board exams also must be passed for full licensing. Specialization may require two to four more additional years of study and exams, depending on the state of practice and specialization choice.

▪ Medical Assistant

Medical assistants help doctors by performing various clinical and administrative duties that may involve telephone monitoring, patient record organization, appointment scheduling, billing and bookkeeping. Some common clinical assignments include taking vital signs; performing basic laboratory tests; disposing of, or sterilizing, laboratory supplies; drawing blood; or preparing patients for physicians. Medical assistants can be employed in the offices of physicians, podiatrists, chiropractors and optometrists.

Academic Requirements — A high school diploma is sufficient to gain employment as a medical assistant, with on-the-job training occurring. Programs also are offered at vocational and technical schools, community or junior colleges and universities.

▪ Physician

Physicians diagnose, treat and work to prevent human illness, disease or injury. They perform many functions, including but not limited to patient examinations, analyses of patient histories and interpretation of diagnostic tests. Physicians use accepted methods of medical treatment, including pharmaceutical agents and surgical procedures. There are two types of physicians: allopathic physicians, better known as the M.D. (medical doctor), and osteopathic physicians, better

known as the D.O. (doctor of osteopathic medicine). Although both M.D.s and D.O.s are physicians who may specialize, perform surgery and prescribe medication, they differ in their health care philosophies and attend separate training schools. Osteopathic physicians (D.O.) believe musculoskeletal manipulation is the key to patient diagnosis and treatment. D.O.s relate the supportive structures of the body, such as bones, muscles, ligaments and nerves, to body function.

Academic Requirements — Students seeking a medical degree usually obtain a bachelor's degree and must submit Medical College Admission Test (MCAT) scores, along with transcripts from undergraduate institutions. Competition is fierce for admission to the 125 allopathic medical schools in the United States, where a four-year curriculum is followed by a three- to eight-year residency, depending on the doctor's area of specialization. Doctors are licensed by the state after passing an examination.

• Physician Assistant

Physician assistants (P.A.) work under a physician's supervision and perform many patient care tasks that traditionally were conducted by doctors. Physician assistants perform complete physical examinations, diagnose illnesses, give treatments, order and review laboratory tests and X-rays, and counsel patients on their health problems. A physician always directly supervises P.A.s; the extent of supervision depends on the work setting.

Academic Requirements — Employment as a physician assistant requires training at an accredited physician assistant program, and more than 125 programs currently exist in the United States. Applicants to a physician assistant program have a background in patient care and often have a bachelor's or master's degree. After two years of study and training, graduates earn a bachelor's degree, associate's degree, master's degree or a certificate of completion, depending on the program. Forty-nine states require a certification exam for employment as a physician assistant-certified (PA-C).

• Podiatrist

Podiatrists, also known as doctors of podiatric medicine (DPM), prevent, diagnose and treat disorders of the foot and ankle. They employ medical, surgical, mechanical or physical means to treat deformities and growths of the foot, design casts and orthotics to treat injuries, and improve posture and walking style.

Academic Requirements — There are seven colleges of podiatric medicine in the United States. Admission

generally requires a bachelor's degree and competitive scores on the Medical College Admissions Test (MCAT). After completing the four-year curriculum, graduates are awarded a doctor of podiatric medicine (DPM) degree.

MENTAL AND SOCIAL HEALTH

Career professionals specializing in mental and social health not only help individuals with severe emotional disabilities and psychological disorders, but they also help clients resolve family conflicts, counsel substance abuse victims and work with the elderly and disabled.

One group that will make greater use of social workers in the near future is the elderly. As the baby boomers age, mental and social health professionals will assist this growing population in adjusting to physical limitations while working to ensure a satisfactory quality of life.

Fortunately, eliciting the help of mental or social health professionals does not necessarily carry the stigma of years past. Job opportunities for workers in this field will be plentiful as more people take advantage of the services provided by these professionals.

• Social Worker

Social workers aid individuals, groups and communities. In a medical setting, they help patients and their families manage problems related to physical, mental or emotional illness and disability.

Academic Requirements — An individual may qualify as a social worker at several educational levels. A bachelor's degree in social work (BSW) can be obtained from nearly 400 programs in the United States. A master's degree in social work is offered by more than 125 colleges and universities, requires 900 hours of fieldwork and takes two years to complete. The master's degree is appropriate for those interested in health and mental health social work. The doctor of social work degree (DSW), with approximately 63 programs nationwide, is required for college and university teaching positions and any formal social work research.

NURSING

Nursing is projected to be one of the fastest growing health care fields. However, the title nurse is much too general to define this group of professionals. Instead, there are homemaker-home health aides, licensed practical nurses, nursing aides/assistants/orderlies and registered nurses. Registered nurses also include certified

nurse midwives, certified registered nurse anesthetists, clinical nurse specialists and nurse practitioners.

Nursing personnel are being hired in record numbers to fill positions that offer increased job responsibilities. With the rapid changes occurring in health care, nurses of all types can use their nursing skills in nursing homes, managed care organizations and physicians' offices. They will gain recognition as a key health care provider whose role is as indispensable as a physician.

▪ Certified Nurse Midwife

Certified nurse midwives (CNM) are registered nurses with advanced training in midwifery that allows them to care for healthy expectant mothers and to provide various clinical services for women. They examine women during pregnancy, manage labor and deliver infants. All 50 states recognize nurse midwifery as a legal profession.

Academic Requirements — Any registered nurse may seek certified nurse midwife status. A certification program usually involves 12 months of education while a master's program usually requires two years.

▪ Certified Registered Nurse Anesthetist

Certified registered nurse anesthetists (CRNA) administer more than 65 percent of the 26 million anesthetics given to patients every year in the United States. In a role similar to an anesthesiologist, CRNAs monitor the vital signs and body functions of surgical patients under anesthesia.

Academic Requirements — Programs in nurse anesthesia are open to licensed registered nurses with a bachelor's degree and at least one year of nursing experience. These programs range in length from two to three years.

▪ Clinical Nurse Specialist

Clinical nurse specialists (CNS) are registered nurses who specialize in a specific field of clinical practice.

Academic Requirements — Educational programs for the various specialties may have different entrance requirements. Most require a registered nursing license and some clinical experience in the chosen specialty. Upon graduation, a master's degree usually is awarded, and graduates are prepared to take a national certification exam.

▪ Homemaker-Home Health Aide

Also known by the titles of home health aide, home care aide and personal care attendant, the homemaker-home health aide cares for elderly and disabled people

in their own homes. Often, clients have been released from hospitals or nursing homes or suffer from debilitating illnesses that restrict their independence. Duties performed by home health aides include housekeeping chores, such as laundry and cleaning; planning and cooking meals; bathing; dressing and grooming the patient; reminding the patient to take medications; assisting in movement and exercise; and serving as a companion both inside and outside of the home.

Academic Requirements — State training requirements for homemaker-home health aides vary. For cases where Medicare offers reimbursement, the federal government demands aides pass a 12-part competency exam that includes communication skills, basic knowledge of body function and changes, proper procedures in the event of an emergency, nutrition and other skills involving the care of ailing individuals.

▪ Licensed Practical Nurse/ Licensed Vocational Nurse

Licensed practical nurses (LPN) provide bedside care to patients and perform various nursing duties. Under the direct supervision of registered nurses and physicians, licensed practical nurses assume the responsibilities of taking vital signs, observing patients and seeing to their comfort, collecting specimens for laboratory tests, administering medications, dressing wounds, starting IVs and, in some cases, supervising nursing aides or assistants.

Academic Requirements — Entrance to a practical nurse educational program may require a high school diploma or its equivalent, although a diploma definitely is recommended. Of the close to 1,100 state-approved training programs, most are offered through vocational-technical schools and community or junior colleges. After a one-year educational program, graduates must pass the N-CLEX-PN examination.

▪ Nurse Practitioner

Nurse practitioners are registered nurses who provide patient health services to maintain health, prevent illness or treat acute or chronic health problems. Nurse practitioners are specialized, but they do so by patient category rather than clinical setting.

Academic Requirements — A licensed registered nurse may or may not need hands-on experience to be accepted into a nurse practitioner educational program. Those accepted usually will receive a master's or equivalent degree upon completion.

▪ Nursing Aide/Assistant/Orderly

Nursing aides, assistants or orderlies, also referred to as hospital attendants, provide basic patient care under direct nursing supervision. Typical work activities include attending to patients' comfort, hygiene and meals; assisting with patient mobility; checking temperatures and vital signs; helping patients keep rooms and beds tidy; and reporting any changes in patients' demeanor or agility to nurses or doctors on duty.

Academic Requirements — Training requirements for nursing aides vary by state and by institution.

▪ Registered Nurse

Registered nurses (R.N.) care for patients and promote their physical, mental and social well-being. The duties performed by registered nurses include monitoring patient status and progress, assisting physicians in care and rehabilitation, administering medication and advising patients and their families on preventive health care measures. The title of registered nurse encompasses numerous specialties. For registered nurses seeking advanced practice, opportunities also are available to become a certified nurse midwife (CNM), certified registered nurse anesthetist (CRNA), clinical nurse specialist (CNS) and nurse practitioner (N.P.).

Academic Requirements — Becoming a licensed registered nurse requires graduation from an accredited nursing school and the successful completion of a national licensing examination. Some schools award either a diploma or a bachelor of science degree in nursing (BSN). Associate's programs last two years and generally are offered by community or junior colleges. Diploma programs offered by hospitals last two to three years, and bachelor's programs offered at colleges and universities last four to five years.

PHARMACY

A career in pharmacy is challenging, exciting and rewarding. New drugs and pharmaceuticals are being created and released to the public at an astonishing rate. Americans today consume a record number of prescription medications and rely on the pharmaceutical industry to educate them about the medicine's proper use.

A neighborhood pharmacist is often a primary source of health information, keeping customers informed of new pharmaceuticals and counseling them about side effects and harmful drug interactions. Because of the increase in drug sales, pharmacy technicians are being hired in record numbers to assist pharmacists and even assume some of the pharmacists' daily duties and responsibilities.

▪ Pharmacist

Pharmacists are experts in the science of medicine and the art of medication therapy. The specific duties of a pharmacist vary according to the place of practice. More than half of the licensed pharmacists practicing today are community pharmacists who fill drug prescriptions, advise clients on treatment regimens and run small neighborhood businesses. Hospital pharmacists provide patients with accurate drug dosages, educate medical staff on the uses and effects of medications, monitor patients' progress and make appropriate changes in treatment as needed.

Academic Requirements — A license is required to practice pharmacy in all states and is achieved by graduating from an accredited training program, passing a state examination and completing an internship in the field. Some educational institutions offer a bachelor of science degree in pharmacy, others offer a PharmD degree (doctor of pharmacy) and some offer both. These programs require six years of post-high school education, as opposed to the five-year bachelor-of science programs. Individuals interested in entering this field should have a strong science background and should research the admissions requirements of the individual pharmacy schools.

▪ Pharmacy Technician/Aide

Pharmacy technicians function as support personnel for pharmacists. They may straighten and organize the pharmacy, assist in updating patient records, keep the pharmacy fully stocked and complete prescription labels under a pharmacist's direction. Some also may receive prescription orders and contact physicians to sanction order refills. Pharmacy aides help with administrative duties, such as answering phones, handling purchases, stocking shelves and other clerical duties.

Academic Requirements — Educational requirements for pharmacy technicians and aides vary according to the type and extent of duties they are hired to perform. Aides work only under direct supervision and may be hired without any formal training. Pharmacy technicians usually attend a community college or vocational-technical school for training in the fundamentals of pharmaceutical science. An associate's degree is the most significant degree awarded for this field, which takes two years to obtain.

THERAPY AND REHABILITATION

The most rewarding aspect of this work is making a difference in the lives of people with physical, mental, emotional or social disabilities. With today's advances in medicine and health technology, trauma victims, premature infants and infirm individuals are more likely to survive than in previous decades. However, many will be disabled and will require the assistance of trained professionals to adjust to their disabilities and function on their own.

Speech-language pathologists help patients with communication problems master proper language and speech while audiologists work with hearing-impaired individuals. Physical therapists and athletic trainers promote the physical health of patients recovering from injuries or trauma.

Orthotists and prosthetists also work with individuals suffering from permanent disabilities, as orthotists and prosthetists manufacture and fit artificial limbs to replace those that have been lost. Rehabilitation counselors have an active role in mainstreaming handicapped patients into a normal life of work and independent living. Respiratory therapists treat and care for patients with pulmonary disorders, such as those with chronic asthma or premature infants.

▪ Athletic Trainer

Athletic trainers prevent, care for and rehabilitate athletic injuries following treatment and rehabilitation procedures prescribed by team physicians. Trainers give immediate first aid, tape injuries, supervise diets, assist in purchasing and fitting athletic equipment and educate athletes about healthy lifestyle habits. On game day, an athletic trainer may help prepare athletes for competition, recommend that certain players refrain from physical activity and treat injuries that occur during the competition.

Academic Requirements — More than 100 accredited institutions offer bachelor's and master's degrees in athletic training. The National Athletic Trainers Association offers graduate level programs for those interested in furthering their education. Studies usually are conducted in human physiology, anatomy, kinesiology and nutrition. Most employers require their athletic trainers to be certified.

▪ Audiologist

Audiologists are professionals specializing in the study of normal and impaired hearing, including the prevention of hearing loss, identification and assessment of hearing problems and the rehabilitation of persons with hearing impairment. Daily duties include conducting ear examinations, training clients in speech and lip reading, measuring noise levels in work settings and teaching individuals to use hearing aids or other helpful devices.

Academic Requirements — In Missouri, a master's degree is required for licensure. Nationwide, 49 states require audiologists to be licensed, and many doctorate programs now are available. Additional requirements include a significant number of hours of clinical work, passing a national examination and fulfilling a post-graduate requirement of clinical experience.

▪ Occupational Therapist

Occupational therapists help disabled people of all ages learn or regain the skills needed to live independent, productive and satisfying lives. Specifically, an occupational therapist may lead patients in physical exercise and assist patients in operating rehabilitative equipment and computer programs. They also may work in the classroom to assimilate disabled children into school settings or teach finance, time management and social survival skills to the mentally handicapped.

Academic Requirements — The minimum educational requirement for entering the occupational therapy field is a bachelor's degree. To obtain the title of registered occupational therapist requires completing an accredited graduate level program and passing an examination of the American Occupational Therapy Certification Board.

▪ Occupational Therapy Assistant

Occupational therapy assistants work with patients to complete the treatment regimen established by occupational therapists. They monitor the patient's progress and make explicit notes for a report to the therapist. On a typical day, an occupational therapy assistant may teach a disabled patient how to move around despite limited mobility, perform routine strengthening or muscle toning exercises with the patient or simply complete office tasks, such as managing insurance forms and other paperwork.

Academic Requirements — An associate's degree from an accredited training program usually is required for an occupational therapy assistant. One-year certificate programs may be sufficient to secure employment. Most states regulate occupational therapy assistants, who must pass a certification exam.

• Orthotist and Prosthetist

Certified orthotists (C.O.) and certified prosthetists (C.P.) fabricate and fit upper and lower limb devices designed to replace or repair limbs lost or disabled through injuries or diseases. Orthotists fabricate and fit orthopedic braces; prosthetists fabricate and fit artificial limbs. Orthotists and prosthetists supervise and are assisted by orthotic/prosthetic technicians, who make and repair the devices but do not have patient contact.

Academic Requirements — To practice as an orthotist or prosthetist, an individual must be certified by the American Board for Certification in Orthotics and Prosthetics. Prerequisites for certification include a bachelor's degree, specific training courses in orthotics and prosthetics and at least one year of supervised field experience. Only a few accredited training programs exist in the United States, and they award either a bachelor's degree or certificate.

• Physical Therapist

Physical therapists work with people who have been physically disabled by an illness or accident or were born with handicaps. Treatment may include exercises to improve muscle strength and coordination; applying heat, cold, water or electricity to relieve pain or to change the patient's condition; therapeutic massages to relieve pain and reduce swelling; and using wheelchairs or crutches to restore a patient's mobility.

Academic Requirements — Employment in the field of physical therapy requires a training program accredited by the American Physical Therapy Association. All physical therapists also must be licensed by the state in which they practice. Because these programs are very selective and the admission process is competitive, firsthand experience and high grades in the sciences will give an applicant the edge from the rest of the field.

• Physical Therapist Assistant/Aide

Physical therapist assistants perform routine treatment procedures as directed by physical therapists and assist them with more complex procedures. An assistant may monitor a patient's progress on exercise equipment; perform massage, heat/cold, electrical and ultrasound therapy; and provide the therapist with a detailed account of all therapeutic sessions. Clerical tasks, supply maintenance, and paperwork often are included among the physical therapist assistant's duties.

Academic Requirements — The standard degree requirement for a physical therapist assistant is an associate's degree, which may be obtained from a community or junior college. Although numerous training programs exist, each has a limited number of openings, and competition for admission is fierce. Most programs last two years, and state laws mandate if all graduates must seek licensure. A physical therapist aide typically receives on-the-job training.

• Recreational Therapist

Recreational therapists, also known as therapeutic recreation specialists, work with individuals with physical, social or emotional disabilities. Through recreation activities, the therapist assists in eliminating barriers to leisure and developing leisure skills. This may mean enabling a handicapped individual to use a public recreational facility, helping a shy patient socialize with peers or exposing an individual to a new and exciting experience.

Academic Requirements — These programs offer various degrees, including associate's, bachelor's, master's and doctorate. Although an associate's degree may suffice for some nursing home or community positions, hospitals and larger clinical facilities generally require a bachelor's degree.

• Rehabilitation Counselor

Rehabilitation counselors help people with physical, mental or social disabilities return to satisfying and productive lives. These counselors assist the disabled to fulfill their full potential. They may counsel them about job opportunities and training availability, assist in job placement or provide counseling to help the person adjust successfully to a new work environment.

Academic Requirements — Students interested in rehabilitation counseling usually obtain a bachelor's degree in a related field and then enroll in a two-year master's program. The clinical training that is a part of most master's programs includes 600 hours of supervised clinical experience.

• Respiratory Therapist

Registered respiratory therapists (RRT) and certified respiratory therapists (CRT) work under a physician's supervision to treat and care for patients with pulmonary disorders. Patients may suffer from chronic asthma or emphysema or may be victims of heart attack, stroke, shock or AIDS. Respiratory therapists care for premature infants with underdeveloped lungs, as well as for seniors who have increased susceptibility to pulmonary disease. Recently, respiratory therapists have begun assuming the additional duties of cardiopulmonary technologists and may choose to specialize in other specific areas within the profession.

Academic Requirements — All entrants into the respiratory therapy field must complete a formal training program. Community colleges offer two-year programs and award an associate's degree; four-year colleges and universities award a bachelor's degree. This education is sufficient to take the exam to become a CRT. If an individual wishes to become a RRT, then two more exams must be passed.

▪ Respiratory Therapy Technician

Certified respiratory therapy technicians (CRTT) work with respiratory therapists to aid in the care of patients with lung or breathing disorders. They have less freedom and independence in working with patients directly and may simply assist the respiratory therapist during actual treatment.

Academic Requirements — Respiratory technician programs generally last from 12 months to 18 months and award a certificate of completion. The National Board for Respiratory Care offers a certification examination for technicians. Often, respiratory therapy technicians first take the technician certification exam and then complete two more years of clinical work before they become eligible to take the respiratory therapist certification exam.

▪ Speech-Language Pathologist

Speech-language pathologists are professionals concerned with the research, evaluation and treatment of communication problems. They work with people of all ages and all types of symptoms, including stuttering, harsh voice, inappropriate pitch and eating or swallowing difficulties. Their patients also may have problems producing and understanding language. For all patients, the speech-language pathologist determines the exact nature of the disability and decides an adequate treatment regimen.

Academic Requirements — To be a practicing speech-language pathologist generally requires a master's degree from an institution accredited by the American Speech-Language-Hearing Association (ASHA).

TECHNICAL INSTRUMENTATION

Technology has made medical treatments more effective and has improved health care providers' diagnostic capabilities greatly. Today, it is possible to observe internal organs, mechanically ventilate a patient's lung and test the functioning of the brain noninvasively. The health care professionals responsible for using this equipment properly are highly trained in both the technical and medical aspects of their respective fields.

Cardiovascular and electroneurodiagnostic technicians and technologists monitor the functioning of the heart and brain, respectively. Perfusionists monitor the heart, lungs and circulation during surgery and can provide long-term care. Radiation therapists administer radiation to patients with cancer. Respiratory therapists treat patients afflicted with lung or breathing disorders. Surgical technologists maintain the sterility of all surgical equipment and assist the physician during procedures. Dosimetrists determine and monitor the dosage amounts of radiation.

▪ Dosimetrist

Dosimetrists work with an oncology team and are skilled in calculating and planning radiation doses. They use various tools to determine the correct dose, which the radiation oncologist approves before it is administered to the patient. This career has emerged because of the need for precision in treating cancer with radiation. Dosimetrists also play an important role in patient-care after treatment.

Academic Requirements — Certification is available for current radiation therapy technologists or for individuals with a bachelor's degree in science and a medical background. Upon completion of an accredited program, individuals may take an exam offered by the Medical Dosimetrist Certification Board. Continuing education hours are required to maintain certification.

▪ Electroneurodiagnostic Technologist

Electroneurodiagnostic technologists operate electroencephalograph (EEG) machines to record electrical brain activity and diagnose brain disorders, such as stroke and tumors. These technologists obtain complete patient histories before any procedure, affix electrodes in the appropriate positions on the patient's head and monitor instrumentational feedback. Originally referred to as EEG technologists, electroneurodiagnostic technologists perform many types of complex testing.

Academic Requirements — Depending on the employer, on-the-job training may be sufficient for most technologist positions. Often, if one previously has worked in other hospital areas, on-the-job training is appropriate. Some facilities require electroneurodiagnostic technologists to pass a community college or hospital-based formal training program.

▪ Perfusionist

A perfusionist operates and monitors equipment that handles the patient's extracorporeal (outside of the body) circulation and respiratory systems. Perfusionists work closely with physicians to monitor a patient's life support during various medical procedures. They may administer blood products, anesthetic agents or drugs when necessary. They are knowledgeable about the various equipment that is used in these procedures, as well as the circulation and respiratory systems of the human body.

Academic Requirements — Certificate programs in extracorporeal technology usually require a bachelor's degree. Other prerequisites can include a background in medical terminology, respiratory therapy or nursing. These programs usually last one to two years.

▪ Surgical Technologist

Surgical technologists work as members of the surgical team to prepare operating rooms for surgery, assist during surgery and perform the proper postoperative procedures. Technologists ensure the operating room is prepared for surgery and all instruments are sterilized properly. They also ensure patients are ready for surgery by preparing the incision site, transporting the patient to the operating room, positioning patients for surgery and assisting the surgical team during and after the procedure.

A scrub technologist assists surgeons by handing them instruments during the surgery and ensuring the immediate surgical field remains sterile.

A circulating technologist is the unsterile member of the surgical team who is responsible for managing the operating room. Circulating technologists dispense sterile items to the scrub technologist, monitor supplies, keep records of the procedure, assist anesthesia personnel and perform other functions.

Academic Requirements — Usually, a high school diploma is a prerequisite for admission to these programs, which may be offered through community and junior colleges, hospitals and vocational-technical institutions. The length of training ranges from nine months to 24 months, depending on if a certificate, diploma or associate's degree is awarded.

DIAGNOSTIC SERVICES

Careers in diagnostic services use tests and evaluations that aid in detecting, diagnosing and treating diseases, injuries or other physical conditions.

CLINICAL LABORATORY SERVICES

Laboratory personnel perform specialized tests on blood, other bodily fluids and tissue samples to detect disease, infection and chemical imbalances in patients. Diagnostic tests play an important role in treating patient's conditions, and advances in technology and medicine have increased their accuracy and application.

▪ Blood Bank Technologist

Blood bank technologists are medical technologists who have advanced training needed for blood bank techniques, such as typing, collecting and transfusing. They also search for blood irregularities and are responsible for processing, testing and labeling donor blood.

Academic Requirements — Similar educational and training requirements exist for all of the careers in clinical laboratory specialization. Once at a graduate level, technologists may gain admission to a specialization program via one of three routes: five years of experience, in addition to a bachelor's degree and medical technologist certification; four years of experience plus a master's degree; or a doctorate degree with two years of experience.

▪ Cytotechnologist

Cytotechnologists (C.T.) are laboratory professionals who study cells and cellular abnormalities. They analyze slides of human cells to search for clues or abnormalities.

Academic Requirements — Training programs in cytotechnology exist at the baccalaureate, post-baccalaureate and master's levels. Usually, students are accepted into a program after their sophomore or junior year of college and enroll after graduating from college.

▪ Histologic Technician and Histotechnologist

Histologic technicians (H.T.) and histotechnologists (HTL) are clinical laboratory workers who prepare body tissues for microscopic examination by pathologists. Histologic technicians perform tasks, such as sectioning and staining tissues, embedding tissues in paraffin or plastic, preparing frozen sections of tissues directly from the operating room and operating

intricate equipment, including microscopes and microtomes. Histotechnologists perform all of the tasks of a technician and more complex procedures, as well.

Academic Requirements — A high school diploma is required for histologic technician certification. Additional requirements include completing an accredited H.T. training program or two years of laboratory experience. In addition to a bachelor's degree, histologic technicians must complete an accredited HTL training program or have a year of experience.

▪ Medical Laboratory Technician

Medical laboratory technicians (MLT) are clinical laboratory personnel who perform a variety of tests under the supervision of medical technologists to aid in detecting, diagnosing and treating diseases. MLTs perform routine tests in the areas of blood banking, chemistry, hematology, immunology, microbiology and urinalysis.

Academic Requirements — Most medical laboratory technicians first receive an associate's degree or certificate from a community or junior college. Certificates also are available from a hospital or vocational-technical school.

▪ Medical Technologist

Medical technologists (M.T.) are clinical laboratory technologists who supervise medical laboratory technicians. They may perform various tests in all scientific areas or may choose to focus their skills in one area.

Academic Requirements — An individual can become an M.T. (AAB) with an associate's degree plus three years of experience. A master's degree in medical technology also is available to M.T.s who are interested in teaching or administrative positions.

▪ Phlebotomist

Phlebotomists are medical laboratory technicians whose primary role is to collect blood samples directly from the patient.

Academic Requirements — In addition to a high school diploma, interested individuals also should be enrolled in an approved phlebotomy program, a formal structured training program or have one year of experience in a laboratory setting.

DIAGNOSTIC IMAGING SERVICES

Diagnostic imaging is a science combining advanced technology and human compassion. The radiographer performs various radiographic or X-ray examinations

on the human body for use in diagnosing medical problems. The radiographer uses knowledge of physics, radiographic exposure, human anatomy, physiology and pathology to create a permanent diagnostic medical image.

The radiographer performs routine and emergency X-ray exams, assists in special radiographic procedures and performs portable radiography in an operating room or at the patient's bedside. Many radiographic procedures may require the use of contrast media, which enables radiographers to study organs that otherwise may not be seen on a radiograph. The radiographer works closely with the radiologist, who specializes in interpreting radiographic images.

▪ Diagnostic Medical Sonographer

Diagnostic medical sonographers use high-frequency sound waves, also known as ultrasound, to create body images showing the shape and composition of body tissues. These images assist physicians in diagnosing diseases, injuries or other physical conditions. As with other radiologic technologists, diagnostic medical sonographers work under a physician's direct supervision and must follow orders explicitly.

Academic Requirements — Formal training is essential. Different facilities offer programs of varying lengths, and the Joint Review Committee on Education in Diagnostic Medical Sonography has accredited 136 programs in this field. Admission to one of these programs requires a high school diploma and some experience in a health-related profession. Training options include a one-year certificate program, a two-year associate's program or a four-year bachelor's program.

▪ Nuclear Medicine Technologist

Under a physician's supervision, nuclear medicine technologists use small amounts of radiopharmaceuticals to diagnose and treat diseases. Radiopharmaceuticals introduced into the body through injection, inhalation or ingestion aid in the diagnostic imaging of organs such as the heart, lungs, liver, kidneys and brain. These radioactive tracers are useful because they are attracted to certain internal organs and emit easily detectable high energy rays. Nuclear medicine technologists may prepare and administer the materials, operate nuclear instruments, position patients for diagnostic procedures and prepare information received from the tests for the doctor's interpretation.

Academic Requirements — Most nuclear medicine technologists have completed a formal training program ranging from one to four years and have a certificate,

associate's or bachelor's degree. Some states require licensure, and certified nuclear medicine technologists may be more attractive to certain employers.

▪ Radiation Therapy Technologist

Radiation therapy technologists (RTT), also known as radiation therapists, comprise another subset of workers known as radiologic technologists. These professionals administer doses of radiation to treat patients afflicted with cancer. By applying radiation in the form of X-rays, gamma rays and electron beams to specific body parts, radiation therapists attempt to halt the spread of disease or offer relief from symptoms. Radiation therapy technologists deliver the course of radiation, provide support and information to the patient and work closely with oncologists to weigh treatment options and monitor the patient's progress.

Academic Requirements — Formal training programs are the most popular means of entrance into this field. A training option available to radiographers interested in pursuing careers in radiation therapy is a one-year certificate program. Training options also include a two-year hospital certificate program, a two- to three-year associate's degree or a four-year bachelor's degree from a college or university. Licensure of radiation therapists is required by 29 states, and most employers prefer therapists who are voluntarily certified.

▪ Radiologic Technologist

The title of radiologic technologist covers various health care professionals who use radiation for diagnostic imaging. Radiographers, who most commonly produce X-rays of the body, are responsible for preparing patients for the procedure and developing the films for analysis by physicians. More experienced radiographers may administer fluoroscopies, which enhance soft-tissue imaging when taken orally.

C.T. technologists use computerized tomography to view patients cross-sectionally. Magnetic resonance imaging (MRI) technologists also are radiographers, but they are skilled in using magnets and radio waves instead of radiation to produce images.

Diagnostic medical sonographers and radiation therapy technologists comprise two more subsets of radiologic technologists.

Academic Requirements — Most employers prefer formally trained radiologic technologists, and programs currently exist for radiography, radiation therapy and diagnostic medical sonography. Radiography programs require a high school diploma for admission and may

be offered at the certificate, associate's or bachelor's degree levels. The American Registry of Radiologic Technologists offers the ARRT certification for radiographers, the largest group of radiologic technologists.

TECHNICAL INSTRUMENTATION

Technology has made medical treatments more effective and has improved health care providers' diagnostic capabilities greatly. Today, it is possible to observe internal organs, mechanically ventilate a patient's lung and test the functioning of the brain noninvasively. The health care professionals responsible for using this equipment properly are highly trained in both the technical and medical aspects of their respective fields.

Cardiovascular and electroneurodiagnostic technicians and technologists monitor the functioning of the heart and brain, respectively. Perfusionists monitor the heart, lungs and circulation during surgery and can provide long-term care. Radiation therapists administer radiation to patients with cancer. Respiratory therapists treat patients afflicted with lung or breathing disorders. Surgical technologists maintain the sterility of all surgical equipment and assist physicians during procedures. Dosimetrists determine and monitor the dosage amounts of radiation.

▪ Cardiovascular Technician and Technologist

Cardiovascular technicians and technologists are trained technical professionals who specialize in cardiac (heart) and vascular (blood vessel) functioning. Electrocardiograph technicians (ECG or EKG technicians) use electrodes to connect patients to a machine that monitors the heart's electrical properties. Cardiology technologists are cardiovascular technologists who specialize in invasive heart procedures. They perform cardiac catheterization procedures such as angioplasty, which involves inserting a catheter into the heart. Noninvasive technologists called echocardiographers use ultrasound to create images of the heart for diagnostic purposes.

Academic Requirements — Technician positions encompassing basic EKG, Holter monitor and stress tests may be given to individuals without previous formal training because on-the-job training offers the necessary experience. The same skills also are taught to student technicians who enroll in a one-year certificate program. Cardiovascular technologists require specialized instrumentation and must complete two to four years of study at an accredited community or junior college.

Careers in health informatics include many different levels of health care-related employment. This pathway includes health care administrators who manage health care agencies, as well as individuals who are responsible for managing all patient data and information, financial information and computer applications related to health care processes and procedures.

HEALTH INFORMATION, COMMUNICATION AND ADMINISTRATION

When considering the key contributors to our nation's health, health care professionals in the areas of information and communication often are overlooked.

Biophotographers, medical illustrators and medical, science and technical writers produce visual and written materials on health topics, while health science librarians funnel this information into accessible collections and databases. Health information managers maintain and organize the host of patient charts, documents and reports that accumulate in large facilities and hospitals.

The accuracy of work done by health information and communication professionals is crucial because it ensures and fosters medical progress.

▪ Health Information Manager

In handling patient records, the health information manager must respect individual patient privacy while contributing to quality care by organizing the medical data. These information specialists are skilled in the following areas: health care databases and database systems, medical classification systems, flow of clinical information, relationship of financial information to clinical data, uses and users of health care information, medical legal issues and security systems.

Academic Requirements — Positions in these careers usually are awarded to applicants with a bachelor's degree in health information management. Medical records technicians generally have an associate's degree from a two-year community college or a junior college program.

▪ Health Services Administration

Health services administrators work with chief executive officers and assistant administrators who manage individual departments. Responsible for their institution's business aspects, they focus on marketing, finances, human resources and public relations. Usually, these administrators will specialize in a specific area of the organization's operation, such as clinical services, administrative services or human resources.

Academic Requirements — The type of education needed will vary, depending on the job. Degrees in health administration are available at the bachelor's, master's and doctorate levels from various colleges, universities and health professional schools.

▪ Medical Coding Specialist

Medical coding specialists convert doctors' bills, services and prescriptions into alphanumeric codes that then can be stored electronically. There are two types of medical coding specialists. Clinical coding specialists (CCS) typically work in hospitals and primarily use the International Classification of Diseases, 9th Revision (ICD-9) coding system. Clinical coding specialists-physician (CCS-P) typically work in doctors' offices, group practices or multispecialty clinics and use current procedural terminology (CPT) codes. Coding specialists can become certified in either specialty.

Academic Requirements — Medical coding specialists must have a high school diploma. Some college courses or an independent study course in medical coding is preferred. Coding specialists should work in the field for two years before taking the CCS or CCS-P exam administered by the American Health Information Management Association. Both certifications represent mastery in clinical coding and must be maintained on an annual basis.

▪ Medical Librarian

Medical librarians provide access to medical and health-related information for health professionals, medical researchers, students and patients.

Academic Requirements — Most health sciences librarian positions require a master's degree in library science (MLS). Individuals pursuing this career should have a strong background in the medical sciences and excellent computer skills, as well as verbal and written communication skills.

▪ Medical/Science/Technical Writer

Medical, science and technical writers are involved in various activities, including presenting health information in an informational and interesting form for the public and offering information to health specialists.

Academic Requirements — Medical, science and technical writers must not only master journalistic and

reporting skills but also have a firm understanding of technical and scientific terminology. Most obtain a bachelor's degree in journalism or English from undergraduate institutions.

▪ Medical Secretary/Transcriptionist

A medical secretary/transcriptionist performs all of the duties of a typical secretary but in the specialized setting of a medical office. Medical secretaries may process correspondence, transcribe dictation, prepare reports or organize meetings for their employers.

Academic Requirements — Anyone with basic office skills is eligible to be hired as a medical secretary and can receive on-the-job training. However, extra training or advanced skills make an applicant more attractive to an employer.

SUPPORT SERVICES

Support services offer a full range of career opportunities from entry level to management, including technical and professional careers.

TECHNICAL INSTRUMENTATION

Biomedical engineers and biomedical equipment technicians must produce and maintain intricate equipment and machinery, which are used to cure illnesses and save lives. The health care professionals responsible for using this equipment properly are highly trained in both the technical and medical aspects of their respective fields.

▪ Biomedical Engineer

Biomedical engineers apply engineering techniques to solve biological and medical problems. They may design patient care equipment, such as dialysis machines and cardiac pacemakers, or develop equipment to measure various body functions. Biomedical engineering includes specialty fields such as bioinstrumentation, biomaterials, biomechanics, cellular biomedical engineering, tissue and genetic engineering, clinical engineering, medical imaging, orthopedic bioengineering, rehabilitation engineering and systems physiology.

Academic Requirements — Most biomedical engineers begin their training in a college-level engineering program. These programs are offered by colleges and universities nationwide and usually last five years. Although it is not always required for employment, students may wish to enroll in a master's or doctorate

program after receiving a degree in biomedical engineering. Others simply may join the workforce and gain valuable hands-on experience in the field.

▪ Biomedical Equipment Technician

Biomedical equipment technicians (BMET) are trained to ensure medical instruments and equipment function properly. Biomedical equipment technicians may be called to fix broken instruments, install equipment in a new facility or simply conduct periodic testing to ensure proper functioning of biomedical equipment. They may specialize in general biomedical equipment, radiological equipment or clinical equipment.

Academic Requirements — Training courses for biomedical equipment technicians are offered at the certificate, associate's and bachelor's degree levels. Many community colleges and vocational-technical schools offer two-year associate's degree programs in biomedical equipment technology, and some offer a more general program in electronics technology. The International Certification Commission for Clinical Engineering and Biomedical Technology is the certifying body of biomedical equipment technicians and sets the requirements for the certification examination.

BIOTECHNOLOGY RESEARCH AND DEVELOPMENT

Careers in biotechnology research and development involve bioscience research and development as it applies to human health. These scientists may study diseases to discover new treatments, invent medical devices used to directly assist patients or to improve the accuracy of diagnostic tests.

CLINICAL SERVICES

As discoveries move out of the laboratory and are considered for human use, they must undergo a series of tests in clinical trials, which are essential for gaining regulatory approval for the drug or device. It typically takes seven to 12 years to bring a biotech product through clinical trials and into the marketplace. Positions exist for all aspects of the clinical trial process, from coordinating the clinical trials to collecting and analyzing the data to monitoring individual sites for compliance with company research protocols.

▪ Clinical Coordinator

Clinical coordinators manage all aspects of clinical trials involving humans. They develop the clinical plans and define specific objectives and strategies. Coordinators monitor clinical activities to identify issues,

variances and conflicts, as well as analyze and recom-
items.

Academic Requirements — Clinical coordinators have bachelor's degrees in health science, information technology or business plus three to five years of health care experience.

▪ Clinical Data Manager/Associate/Specialist

The primary responsibility of clinical data managers/associates/specialists is to ensure the validity of data collected from clinical trials and format them for statistical analysis. They design collection instruments, establish databases and track and manage the flow of data to and from the investigative sites. A specialist is responsible for collaborating with various departments on the design, documentation, testing and implementation of clinical data studies. They develop systems for organizing data to analyze, identify and report trends.

Academic Requirements — Most positions are filled by an individual with a high school diploma. Clinical data managers also may have a biotech certificate and two to five years of experience in clinical data management or a bachelor's degree with zero to two years of related experience.

FACILITY SERVICES

Medium and large biotechnology companies require a large level of support services to keep research and discovery efforts running smoothly. Coordinating and maintaining the influx and efflux of materials and products is a key activity. Moreover, federal and state regulations often require these facilities to have specific personnel responsible for monitoring safety and compliance issues. Biotechnology companies offer career opportunities for distribution management personnel; material planning specialists; engineers; mechanics; electricians; heating, ventilation and cooling (HVAC) technicians; welders; and security guards.

▪ Environmental Health and Safety Specialist

An environmental health and safety specialist is responsible for developing, implementing and monitoring industrial safety programs within the company. They evaluate new equipment and raw materials for safety and monitor employee exposure to chemicals and other toxic substances.

Environmental technicians are responsible for water and air sampling and monitoring; permit processing, calibration and maintenance of scientific monitoring equipment; data collection; and routine analysis. They install and service recording instruments, maintain physical stations where data is collected and inspect stations' records to ensure quality assurance and preventive maintenance procedures are conducted properly.

Academic Requirements — Most positions require a high school diploma with some specialized or technical training in environmental sciences, chemistry, math, hydrology, ecology, toxicology or a related field. Community colleges offer a two to three year program in environmental technology.

▪ Facility Manager/Supervisor (Animal Sciences)

A facility manager/supervisor oversees all activities and staff in an animal facility. They set and maintain a high standard of animal husbandry while ensuring a smooth-running animal facility, including a stable lab environment, proper functioning of equipment, appropriate levels of supplies, and environmental monitoring. They hire, develop, manage and appraise the animal facility staff.

Academic Requirements — Most facility managers or supervisors have a bachelor's in biological sciences and a minimum of five years experience in animal husbandry. Previous supervisory experience in an animal facility normally is required.

▪ Facilities Technician

A facilities technician performs daily monitoring, repair and preventive maintenance activities on critical systems and equipment. They troubleshoot, install and modernize new and existing systems, including refrigeration equipment, water systems, HVAC systems and electrical systems.

Academic Requirements — A facilities technician must have an associate's degree or a certificate from a two-year technical school in the mechanical/electrical field. Another option involves obtaining a high school diploma and having five or more years of experience in good manufacturing practice maintenance.

▪ Greenhouse Assistant — Research and Development

A greenhouse assistant performs various tasks and experiments to determine optimal cultural requirements and performs tasks related to disease and pest prevention. They often are required to collect, record and analyze data, as well as interpret results.

Academic Requirements — Most positions are filled by individuals with a high school diploma, an associate's degree or equivalent and zero to two years of relevant experience in greenhouse/plant operations.

▪ Quality Control Analyst

Quality control analysts conduct routine and non-routine analysis of raw materials, as well as in-process and finished formulations. They compile data for documentation of test procedures and prepare reports. Other responsibilities include calibrating and maintaining lab equipment, reviewing data obtained for compliance to specifications and reporting abnormalities.

Academic Requirements — A quality control analyst position requires a bachelor's degree in a scientific discipline or equivalent and experience in microbiology, chemistry or biochemistry.

▪ Safety Manager

Safety managers are responsible for developing, implementing and managing the company's safety programs to ensure the safety and security of employees and facilities. They establish risk management and business contingency programs and training for security employees.

Academic Requirements — The position requires a high school diploma or a bachelor's degree and three to five years of experience in law enforcement or security management. Additional training is needed in CPR, and knowledge about basic first aid is a plus.

LABORATORY SERVICES

The heart of scientific discovery and innovation is in the individual experiments conducted in the laboratory. Performing such experiments requires people with good technical and organizational skills. In addition to physically conducting experiments, additional duties include keeping records, performing animal procedures, managing projects, analyzing data and writing reports. Job titles often become irrelevant in labs because individuals who demonstrate a mastery of technical skills often take increasing roles of responsibility in the lab.

▪ Animal Technician

Animal technicians are responsible for the daily care of animals used for research. They perform surgery and postoperative care and are responsible for overseeing animal and supply procurement, preventive maintenance of facility equipment, cleaning animal cages and racks, daily rounds and observation to check animal health status.

Academic Requirements — Most animal technician positions are filled by individuals with a high school diploma and zero to two years of related laboratory experience.

▪ Assay Analyst

An assay analyst is responsible for preparing and maintaining cell cultures and following standard protocols to perform tests on tissue and cell cultures. Assay analysts also maintain records required by good manufacturing procedures.

Academic Requirements — Most assay analyst positions require a high school diploma and zero to two years of related laboratory experience.

▪ Laboratory Assistant

A laboratory assistant performs various research/laboratory tasks and experiments under general supervision. Most work involves assignments that are moderately complex and where judgment is required in resolving problems and making routine recommendations. Laboratory assistants also maintain laboratory equipment and inventory levels of laboratory supplies.

Academic Requirements — Most positions require a high school diploma, a biotechnology certificate, an associate's degree or equivalent experience with a scientific background.

▪ Media Prep Technician — Research and Development

Media prep technicians are responsible for media preparation in the research and development area. They perform experiments and develop and maintain record keeping for procedures and experiments.

Academic Requirements — A media prep technician position requires an associate's degree in science and zero to two years of related experience. Some companies provide an on-the-job training program.

▪ Plant Breeder — Research and Development

A plant breeder is responsible for the design, development, execution and implementation of plant breeding research projects in collaboration with a larger research team. A plant breeder's responsibilities can include making contributions to and developing good public relations with scientific and other professional communities.

Academic Requirements — A plant breeder position requires a bachelor's degree and zero to two years of plant breeding or agronomical experience.

▪ Research Assistant/Associate

A research assistant/associate is responsible for performing research and laboratory tasks or developing experiments for projects and products. They make detailed observations, analyze data and interpret results while preparing technical reports, summaries, protocols and quantitative analyses.

Academic Requirements — Most companies require an associate's or bachelor's degree in a scientific discipline and zero to two years of related laboratory experience.

MANUFACTURING

One of the biotechnology industry's greatest growth areas is manufacturing. Many biotech companies that formed in the late 1980s and early 1990s now have products that are moving into the manufacturing pipeline. Some of the largest companies are expanding their product base, and therefore, their manufacturing capacity. During the next two to five years, the demand for qualified manufacturing personnel will continue to increase. Manufacturing careers often invoke the three "Ds" — dark, dirty, dank. However, the manufacturing industry has modernized significantly and offers high paying, highly technical jobs.

▪ Manufacturing Associate/Technician

Manufacturing associates play an important role in implementing new technology into the manufacturing process or establishing a new manufacturing area. They may work with fermentation, protein purification, solvent extraction, tissue culture, preparation of bulk solutions, noncritical aseptic fills of buffers, filling and labeling vials under sterile and nonsterile conditions, large scale bioreactor operations, critical small or large volume sterile fills and aseptic manipulation of cell cultures. They monitor processes and results and

suggest methods to ensure process success. A technician is responsible for assisting manufacturing in specific product-related operations in cell culture/fermentation.

Academic Requirements — Most companies require an associate's degree with four to seven years of related work experience or a bachelor's degree in a related life science and a minimum of two to three years of experience. Familiarity with regulatory and standard operating procedures normally is required.

▪ Manufacturing Instrument/ Calibration Technician

Manufacturing technicians maintain tests, troubleshoot and repair various circuits, components, analytical equipment and instrumentation. They calibrate instrumentation, perform validation studies and specify and request purchase of components.

Academic Requirements — An associate's degree in electronics technology or equivalent technical training related to mechanics or instrumentation generally is required, along with two to four years of experience with instrumentation, problem diagnosis and repair.

▪ Process Development Associate/Technician

Associates or technicians are responsible for defining, developing and optimizing processes and equipment in the laboratory. They identify and resolve issues with materials, processes or equipment. They mix specific compounds, prepare test samples for analysis, maintain material inventories and operate laboratory equipment as required. They also perform process validation/equipment qualification and maintain files on lab tests, work procedures, formulations, calculations and assembly methods.

Academic Requirements — Most companies require a bachelor's degree in engineering or a related field plus two to five years of experience in process/product development.

▪ Quality Control Technician

A quality control technician performs inspections, checks, tests and sampling procedures for the manufacturing process. Other duties include in-process inspection, documenting results, monitoring critical equipment and instrumentation.

Academic Requirements — Technician positions require a high school diploma, a biotech certificate or an associate's degree plus zero to five years of experience in quality control systems.

▪ Validation Technician

A validation technician is responsible for developing, preparing the installation of and revising test validation procedures/protocols to ensure a product is manufactured in accordance with appropriate regulatory agency validation requirements, internal company standards and current industry practices. A validation technician compiles and analyzes validation data, prepares reports and makes recommendations for changes and/or improvements.

Academic Requirements — Most positions require a high school diploma or equivalent and zero to two years of related experience.

REGULATORY/TECHNICAL SUPPORT

Pharmaceutical products and medical devices are among the most tightly regulated items in the United States. Maintaining the appropriate records and documentation of regulatory compliance ensures good relations with regulatory agencies. In addition, services of technical writers, patent agents and quality control specialists are necessary to communicate scientific findings, protect intellectual property and ensure product quality, respectively. As companies mature, positions in planning, public relations, investor relations, government relations, distribution management, material planning, legal counsel and accounting and finance will become available.

▪ Documentation Associate/Assistant/ Regulatory Affairs

Documentation associates/assistants are responsible for coordinating and administering the large number of documents detailing drug and/or device production procedures, including planning and scheduling word processing and production resources. Working with project teams, they develop and coordinate the time lines for the necessary documentation for electronic submission to regulatory agencies.

Academic Requirements — Most positions require a high school diploma or a biotech certificate and one to three years of experience with computers and a local area network (LAN) in a scientific or regulatory environment or a bachelor's degree with zero to two years of related experience.

▪ Medical Writer

A medical writer is responsible for the timely preparation, production and quality control of regulatory documents, including coordinating with

regulatory project teams, creating editorial time lines and work flow specifications, scheduling and tracking documents, assessing documentation staffing needs, participating in "round-table" reviews of documents, establishing project-specific style guidelines, editing at various levels, writing and proofreading. They hire, train and supervise temporary editorial employees and coordinate their work.

Academic Requirements — Most companies require a bachelor's degree and three to five years of related experience. More advanced positions require a master's degree and five to eight years' publications experience, including at least three years in a scientific or technical publishing environment.

▪ Patent Agent/Administrator

A patent agent/administrator is responsible for preparing, filing and processing patent applications for a company. Other duties involve negotiating and drafting patent licenses and other agreements. A patent agent also conducts state-of-the-art searches and may assist with appeal and interference proceedings.

Academic Requirements — The patent agent/administrator position requires a bachelor's degree or equivalent with zero to two years of related experience. An agent must be registered to practice before the United States Patent and Trademark Office.

▪ Regulatory Affairs Associate/Specialist

Regulatory affairs associates/specialists coordinate and prepare document packages for submission to regulatory agencies, internal audits and inspections. They compile all material required for submissions, license renewals and annual registrations.

Academic Requirements — Both positions require a bachelor's degree and zero to two years of related experience.

▪ Technical Writer

A technical writer is responsible for writing and editing standard operating procedures, clinical study protocols, laboratory procedure manuals and other related documents. They edit and/or rewrite various sources of information into a uniform style and language or regulatory compliance plus assist in developing documentation for instructional, descriptive, reference, and/or informational purposes.

Academic Requirements — A technical writer requires a bachelor's degree or equivalent and zero to two years of experience in writing technical documentation.

For more information, including salary ranges and schools with programs for health care careers, visit [illegible]

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The Health Alliance of Mid-America LLC — an affiliation of the Kansas and Missouri hospital associations.

FUNDED BY

Full Employment Council Inc., in cooperation with the Kansas City Vicinity Workforce Investment Board